

Pushing the Production Line Towards Maximum Efficiency

Inside Volvo Cars' Torslanda factory in Gothenburg, Sweden, the assembly line has halted. A new car should be rolling off this line every one minute 12 seconds. But a malfunction in a complex power tool on the track — where cars move steadily from one assembly position to the next — has stopped the vehicles rolling forward. Senior managers know that downtime is bad news — 31% of stoppages result in lost production that cuts right into the bottom line.

There is nothing unusual in stoppages on car assembly lines the world over. Or on production lines in other industries for that matter. Equipment fails, spare parts are not in stock, the specialist engineer isn't on call. They are just some of the frustrations of manufacturing. But in an ever-more competitive world, they are increasingly expensive frustrations.

At Volvo, production line stoppages have become an issue that strikes right at the heart of the company's strategy. And at the future prosperity of Gothenburg, Sweden's second largest city. Ten years ago, faced with over-capacity in the world's automobile industry, there was serious talk of closing the Torslanda plant.

Gothenburg is too large to be a one company town, but closure of the factory, setting thousands of workers adrift on the local labour market, would have been an economic disaster for the city. It was too damaging to contemplate. Political pressure ensured the plant stayed open. Volvo's senior management received an urgent wake-up call. There was no question of business as usual. The Torslanda plant had to become more productive. It needed a new strategy.



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‘Make or Break’ Time – More Cars, Less Cost

In the automobile industry, quality and volume is everything. Make more cars using the same plant and workforce and you've pushed down costs, sharpened competitive edge and given yourself the chance to chisel out another percent of market share. Moreover, the higher the volume, the more opportunities there are to seek out economies of scale and other manufacturing efficiencies.

Volvo's management realised they didn't have a choice: they had to make more cars and, in doing so, turn Torslanda into an exemplar of world automobile manufacturing efficiency. So the company embarked upon an ambitious growth plan. In 2001, 150,000 cars should roll out of the Torslanda plant. By 2004, Volvo wants to see that number rise to 230,520. And all produced by the current plant and with only a limited increase in

workforce. Which makes production line stoppages a potential showstopper. But that isn't the only problem Volvo managers are wrestling with. Written into the company's business plan are cost savings of 5% a year. Even that ambitious target may not prove to be enough to keep pace with cost reductions in other parts of the global auto industry. So in the search for new savings, a key challenge is to find ways to manage the production assets — the multi-million dollar investment in plant and machinery used to manufacture cars — more effectively.

That is not easy because the ever-more rapid pace of change in the auto industry poses a new raft of asset management problems. Car model lifecycles are shorter, so there is more pressure on bringing the production assets up to peak operating efficiency more quickly. Multiple model changes mean that the same production facilities must be able to cope with a bewildering combination of manufacturing variations. And the production assets — such as robots and computers — are becoming more complex, and thus more prone to error.

So these manufacturing pressures are all towards more stoppages. But Volvo managers know that is not an option if its new business plan is to succeed. According to Håkan Berndtsson, General Manager, Maintenance at Volvo, Torslanda, "Volvo have adopted a strategy which is actively seeking out new ways to create value in the company's production stream by managing assets more effectively. A key tool in this strategy is MAXIMO, our work and materials management software solution from MRO Software."

Getting More, for Less – Right at the Heart of Volvo Cars

Car makers the world-over install software systems to control and collect information about every part of the manufacturing process. What makes Volvo's use of MAXIMO so different is the way the software has been placed at the heart of a value creation process which is driving the new business strategy. There are two key aspects to the way senior Volvo managers are using MAXIMO.

First, they are seeking to lessen the likelihood of production line stoppages and shorten the length of those that do occur. Secondly, they are driving through a cost reduction programme on the high-budget maintenance of those assets, such as the growing population of paint shop robots and the multiplicity of complex power tools on the assembly line. If Volvo managers are successful in both objectives, they should realise more value from their investments and be well on their way to putting the company back among the world's most productive car makers.

The key to realising this extra value is to collect and use information about the production assets in more effective ways than was possible before MAXIMO was installed. For example, managers need to know more precisely where faults are likely to occur as production of new models develops. They must, for example, be able to find out quickly whether manufacturing a new model in a slightly different way will cause unforeseen production equipment faults that could pile up unexpected costs. Using that information, they can take preventative action and also work out how to use the labour and materials that are needed to carry out both the preventative maintenance and any emergency repairs more effectively.

Volvo management lacked good information to support the effective management of the production line equipment and assets. The implementation of MAXIMO was decided upon as the way in which Volvo would better manage the production lines.

Managing Volvo Cars' Assets

MAXIMO, and the methodologies it advocates, provide organisations with a level framework that helps managers use the information generated by MAXIMO, such as the reliability of different assets or the cost of maintenance materials, to drive down costs. The methodology is based on five key stages. The first is the need to define the value stream. The team needed to understand which parts of the business generate revenue — clearly, the manufacture of cars — and which parts

support, but do not directly generate, revenue such as some back-office functions like administration.

The second stage in the methodology involves connecting the production assets to the value stream. In Volvo there are hundreds of production assets, all playing a different role as the car emerges from the body and paint shops and proceeds down the assembly line. In fact, around 60% of the production assets are in Volvo's body shop, 30% in the paint shop and the remaining 10% on the assembly line.

This often proves an illuminating experience and senior managers have previously not had such an explicit map of the links between value creation and asset use. This stage highlights those assets that really are mission critical. Some assets will be assembly line stoppers if they fail. Others may merely slow work in a non-critical process or they may cause a temporary slowdown that will not affect overall workflow because of buffer stocks further down the value stream.

The third stage of the process is to connect demand to the assets. All assets consume materials, labour and equipment, but not all equally. And, again, managers often have no clear picture of how asset consumption takes place until they map it in a specific way. This is because the ordering of materials and the use of labour is usually divorced from specific assets. So, overall asset consumption hides an uneven pattern.

Volvo discovered another important reason for carrying out this phase. As it ramps up production throughput of new cars, the increased demand on production assets will not necessarily fall equally. Some may react well to higher volumes, others less well. In the drive to reduce costs, it is vital to have information about this as soon as possible so that managers can take corrective action.

By this stage, Volvo managers could see which parts of the value stream added most value, which assets were critical and which assets had the highest demands. By looking for critical assets with high demands, they could

begin to see those areas where they needed to focus attention. But if they were to reduce costs, they needed something more and this was supplied in the fourth stage of the methodology — connecting the supply to the demand.

Streamlining the Supply Chain

When a robot or computer, for example, breaks down, somebody has to fix it and, chances are, they will need equipment and materials to do so. The location and availability of all those elements will determine how quickly the asset can be repaired and brought back into action. Because Volvo managers now had a map of the critical assets and a picture of their demand for materials, equipment and labour, they could begin to take decisions in order to optimise the maintenance supply chain.

Optimising the supply chain provided an opportunity to ask tough questions. Why is an engineer kept on one hour's standby for an asset of marginal importance when it takes three hours to summon up an engineer if a more critical asset breaks down? Do we really need such large stocks of these components for an asset that stops working only once a year?

Suddenly, Volvo's managers found themselves conducting an informed debate about how to generate more value from their assets.

And this ability to ask — and answer — questions introduces the vital fifth stage of the methodology, compressing demand-supply connections. Volvo managers now understand much more about the order of



importance and demand implications of all assets. As a result, they can prioritise improvement programmes and focus on issues such as eliminating waste, cutting inventory and reducing lead-times.

These are still early days for Volvo Cars Torslanda in using MAXIMO and applying new working methodologies to its production maintenance processes. But already the company is finding that there are both short-term and long-term implications of the access to the new quality of information about asset use they have gained. In the short-term, they are taking decisions to improve the use of existing assets. In the longer-term, they are building up a knowledge base that will help both design engineers and other asset managers when the time comes to replace a specific asset with a new one. So the new approach is driving both short-term and long-term value creation.

Speeding-up Bottom-line Results

But what are the bottom-line results? An independent consultant, Net Results, was commissioned to determine the expected value of the MAXIMO implementation to the Volvo Cars Corporation. There have, of course, been costs in installing MRO Software's MAXIMO software and in applying the methodology. Over three years, Net Results has estimated these will be \$1.08m. However the savings in asset maintenance materials, labour and equipment will build steadily over the three years, from \$0.84m in year one, to \$1.3m in year two and \$1.6m in year three. If the programme keeps on track, Volvo's investment in this programme will break even in the early part of year two and then start to deliver sharply increasing return on investment benefits. And Net Results believes these pay-back figures are "extremely conservative".

The Torslanda assembly line is rolling again. Nobody at Volvo Cars believes that the combination of MAXIMO and new working methodologies is going to end stoppages completely. That was never in the equation. But senior management now has a deeper understanding of what can be done to enhance value creation in that part of the business that really matters — manufacturing new cars. And that means Torslanda will be making new Volvos for years to come.



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